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Augmentative communication for the motorically handicapped child: Evaluation and intervention.

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AUGMENTATIVE COMMUNICATION FOR THE MOTORICALLY HANDICAPPED CHILD: EVALUATION AND INTERVENTION

By

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Chapter 1

INTRODUCTION

Background

Exposure to motorically impaired, nonspeaking children is a humbling experience. It is often assumed that, because communication is difficult for these children, their will to express thoughts and needs is reduced. It is the experience of the writer that the opposite is true. Most of the children encountered throughout the writing of this paper demonstrated a great deal of innovation and persistence in their efforts to interact with the environment. They represented warm, caring, and fun-loving individuals whose potentials often went unrecognized. Collaboration on a project to facilitate the evaluation of these children was therefore initiated.

It was hoped that a tool could be devised that would guide therapists, teachers, and parents in an assessment of the special problems these children present. The goal of the project was to create a useful evaluation form that included an organized look at the gross and fine motor limitations of a child as a prerequisite to the selection of an effective augmentative communication system. This paper focuses on the communication portion of the evaluation form. This information and an in-depth discussion of gross and fine motor development in a cerebral palsied child, authored by Meek (forthcoming), was combined in a mannual to be published in September, 1981

Definition of Terms

Terminology referring to nonspeaking people and their communication methods varies a great deal. In order to avoid confusion in this regard, the following definitions have been extracted from an American Speech-Language-Hearing Association (1980) position paper on nonspeech communication.

> 1. Non-speaking: Group of individuals for whom speech is temporarily or permanently inadequate to meet all of his or her communication needs and whose inability to speak is not due primarily to a hearing impairment.
> 2. Unaided: All techniques which do not require any physical aids.
> 3. Aided: All techniques where some type of physical object or device is used.
> 4. Augmentative Communication System: The Total communication system of an individual which includes:
> a) a symbol set or system.
> b) a communication technique.
> c) communication/interaction behavior.

A chart clarifies this definition of augmentative communication (see Appendix A).

The position paper includes a caution to not rely on a reader's mutual understanding of this terminology when referring to the nonspeaking population; it highlights the importance of being descriptive in writing or speaking about patients. This same caution is stated in Schiefelbusch (1980).

> The problem lies in the use of the descriptor nonvocal or nonspeech without elaboration of the individual's abilities (or, in the case of programs, without elaboration of target populations for whom they were designed and with whom they have been tested or successfully implemented). Titles such as "Communication Invervention for Nonvocal Individuals" or "Nonspeech Communication Program" imply that research results or intervention procedures are applicable to all nonvocal persons, when, in fact, the research has been conducted or the program developed with a particular patient.

This paper is limited to the discussion of augmentative communication techniques with the motorically handicapped, primarily cerebral palsied child. An effort was made to provide specific abilities and limitations in the discussion of the children evaluated. It is hoped that this effort will be helpful in an evaluation of and intervention with children. The content also emphasizes evaluation and intervention with preschool and school-aged children; however, it is felt that much of the information can be applied to the nonspeaking, motorically handicapped adult.

Chapter 2

LITERATURE REVIEW

A review of the literature on augmentative communication in the nonspeaking population revealed a great deal of information for symbol systems, augmentative indication modes, commercial augmentative systems, noncommercial augmentative systems, and language programming. The majority of the information was not limited to nonspeaking persons of specific etiologies; it provided broad descriptions of particular topics as they pertained to the entire nonspeaking population. In the interest of efficient reporting, a brief summarization of information is provided for each category. The reader may wish to refer to the references cited to obtain more details.

Symbol Systems

Judy Montgomery (1980) supplied a complete list of symbol systems and descriptions of each in her manual. A particularly helpful list noted which symbols are available in commercial augmentative systems. Franklin Silverman (1980) divided his discussion of symbol systems into visual, auditory, and tactile categories. He provided a description of nine types of symbols with suggestions for the system most beneficial for nonspeaking persons with different handicapping etiologies. McDonald[1] wrote of practical considerations in the

[1]E. T. McDonald, "Conventional Symbols of English," *Non-vocal*

selection of symbol systems for various clients. He related stories regarding specific patients and discussed effective symbol systems devised throughout his experience with this population.

Other references concentrated on specific types of symbol systems such as Blissymbolics (Harris-Vanderheiden,[2] McNaughton,[3] McNaughton and Kates,[4]), sign language (Moores,[5] Stokoe,[6]), Premack-type Plastic Word Symbols (Premack and Premack[7]), etc. It must be emphasized that this list includes but a portion of the information available on augmentative symbol systems. Most books pertaining to the nonspeaking population contain discussions on this topic.

Communication Techniques and Aids for the Severely Physically Handicapped, eds. G. C. Vanderheiden and K. Grilley (Baltimore, Maryland: University Park Press, 1976).

[2]D. Harris-Vanderheiden, "Blissymbols and the Mentally Retarded," *Non-vocal Communication Techniques and Aids for the Severely Physically Handicapped,* eds. G. C. Vanderheiden and K. Grilley (Baltimore, Maryland: University Park Press, 1976).

[3]S. McNaughton, "Blissymbolics--An Alternative Communication System for the Non-vocal Pre-reading Child," *Non-vocal Communication Techniques and Aids for the Severely Physically Handicapped,* eds. G. C. Vanderheiden and K. Grilley (Baltimore, Maryland: University Park Press, 1976).

[4]S. McNaughton and B. Kates, "The Application of Blissymbolics," *Nonspeech Language and Communication,* ed. R. L. Schiefelbusch (Baltimore, Maryland: University Park Press, 1980).

[5]D. Moores, "American Sign Language: Historical Perspectives and Current Issues," *Nonspeech Language and Communication,* ed. R. L. Schiefelbusch (Baltimore, Maryland: University Park Press, 1980).

[6]W. Stokoe, "The Study and Use of Sign Language," *Nonspeech Language and Communication,* ed. R. L. Schiefelbusch (Maltimore, Maryland: University Park Press, 1980).

[7]D. Premack and A. Premack, "Teaching Visual Language to Apes and Language-deficient Persons," *Language Perspectives--Acquisition, Retardations, and Intervention,* eds. R. L. Schiefelbusch and L. Lloyd (Baltimore, Maryland: University Park Press, 1974).

Augmentative Indication Modes

Harris and Vanderheiden[8] divided augmentative indication techniques into three categories: direct selection, scanning, and encoding. These approaches are fully described and the advantages and disadvantages of each are weighed. A discussion of populations that may benefit from the use of various indication techniques is also provided. This information may help in the determination of an appropriate method for a specific client. Pictured displays of each mode are included.

In switch utilization, Montgomery (1980) listed available switches and included activation requirements by body part. Particular switch types are paired with compatible commercially available communication systems. Illustrations demonstrated the use of various switching mechanisms. Vanderheiden and Grilley (1976) had a glossery at the end of their manual which demonstrated the utilization of approximately twenty-five different switching mechanisms. Brief descriptions and line drawings helped clarify the information.

Silverman (1980) divided methods of indication into general, gestural-assisted and neuro-assisted modes. These terms are thoroughly defined throughout his text. Included is information on how to build various switching mechanisms as well as photographs and line drawings of a number of indication modes. He also provided an excellent chart which listed a number of switches and physical movements required to activate the mechanisms.

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[8]D. Harris and G. Vanderheiden, "Enhancing the Development of Communicative Interaction," *Nonspeech Language and Communication*, ed. R. L. Schiefelbusch (Baltimore, Maryland: University Park Press, 1980).

Commercial Systems

Vanderheiden and Grilley (1976) included a "Masterchart of Communication Aids" which listed the names of aids, manufacturers, general descriptions, the symbol selection process, output devices, their portability, sizes, weights, prices, and special features. The extensive list contained approximately sixty items. Harry and Vanderheiden[9] also provided descriptions of available communication aids. Several photographs supplemented their text.

Montgomery (1980) provided a list of manufacturers of augmentative communication systems, with addresses, so that one is able to write to manufacturers for information on specific systems. A list of commercially available communication aids is paired with "entry level skills"; a patient should have at least one half of them before introduction of a system is attempted. For example, in order to use the Zygo 16 Board a child must have a consistent body motion, adequate visual acuity, visual perception, and an ability to understand switch operation. This information helps an individual involved in intervention with a nonspeaking population narrow the augmentative communication systems that would be appropriate for a particular patient.

It should be noted that, according to one manufacturer of augmentative communication systems, the published lists of available equipment are rapidly outdated as the field of technology expands. The most reliable method of determining available current systems is to write to manufacturers and request catalogues or brochures. It is the

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[9]Ibid.

author's experience that some manufacturers are extremely knowledgeable in the selection of appropriate augmentative communication systems for different types of nonspeaking clients.

Noncommercial Communication Systems

McDonald[10] provided various aspects for consideration in the development of a noncommercial augmentative communication device for a particular child. He believed that such systems should be individually constructed so as to ensure that each child has a system tailored to his needs. Kladde[11] provided considerations for the development of frame-type systems that are attached to wheelchairs as well as laminated communication booklets. She discussed stability, protective features, durability, visibility, mobility, and portability.

Schurman[12], an occupational therapist, supplied input on custom designing communication board frames taking into consideration a child's physical abilities and special communication needs. Although extensive detail regarding the physical assessment of a child is not included, basic information pertaining to this topic and the importance

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[10]McDonald, *op. cit.*

[11]A. G. Kladde, "Nonoral Communication Techniques: Project Summary #1, August, 1967," *Nonoral Communication System Project 1964/1973*, ed. B. Vicker (Iowa City, Iowa: The Campus Stores Publishers, 1974).

[12]J. A. Schurman, "Custom Designing Communication Board Frames: The Role of the Occupational Therapist," *Nonoral Communication System Project 1964/1973*, ed. B. Vicker (Iowa City, Iowa: The Campus Stores Publishers, 1974).

of first establishing these capabilities is emphasized. Wheelchair frame designs, complete with specific measurements, are provided to help in the duplication of the systems presented.

Silverman's (1980) appendices dealt with the sources of components for homemade augmentative communication systems with construction details for several inexpensive displays and other components. Addresses and brief descriptions of various organizations distributing augmentative communication system components are included. Lists of components, photographs, and schematic drawings help clarify his construction plans for homemade devices. Monthly newsletters also provided information on ideas and instructions for homemade augmentative communication systems. Several Pacific Northwest Nonvocal Communication Group newsletters included at least one complete system design and case study per issue.

Language Programming

The literature search revealed specific language programming outlines used with augmentative communication systems (Vicker, 1974). As in most areas of intervention with a nonspeaking child, language therapy should be individually tailored to meet his communication needs. Montgomery (1980) stated,

> If we look carefully at the communication of the intact child under 2 years we find his language revolves around having his needs met, commenting on here and now and imitating patterns of those around him. It is possible to design our intervention for the nonoral child to address those same interests. Food, daily routine, family members and similar concepts lend themselves well to this development.

Perhaps the most useful tool in designing language intervention

strategies is knowledge of normal language development. The literature provided some useful hints in the organization of language therapy goals. Montgomery (1980) listed specific skill areas and supplied information on how to facilitate the learning of a particular skill.

Kladde[13] considered categories and methods of organization of language material in augmentative communication systems. Her presentation of case studies supplied particular accomplishments with various children. Harris and Vanderheiden[14] gave ideas for enhancing communication in nonspeaking children. Their considerations included interaction as a program goal, basic operating principles, an intervention entry point, program scope, program implementation, and normal communication development as a program model.

In summary, although literature helps in facets of language intervention with a nonspeaking population, general knowledge of normal language development and common sense serve as the clinician's most valuable tools.

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[13]Kladde, *op. cit.*

[14]Harris and Vanderheiden, *op. cit.*

Chapter 3

THE NEED FOR A NEW EVALUATION FORMAT

The majority of evaluation forms reviewed in the literature for augmentative communication pertained to an entire spectrum of nonspeaking persons including disorders such as dysarthria, verbal dyspraxia, aphasia, hearing impairment, mental retardation, and childhood autism. Due to the wide variety of problems presented by various nonspeaking groups, the evaluaton forms encompassed many areas of functioning. They often consisted of extremely broad questions and tended to be unwieldy. It was felt that completion of the forms did not provide specific information about a child's particular problems. A need to create forms that concentrate on specific disorders was seen. The completion of the forms should result in a profile of a child from which individual intervention strategies can be devised. The author's evaluation form is to be used with nonspeaking, motorically handicapped children.

In dealing with this population, the importance of evaluating motoric functioning is apparent. This belief is held by several individuals. Two examples appear below.

> In our assessment, we need to note how various positions, movement, and changes affect the total body (Montgomery, 1980).

> It is necessary to evaluate motor functioning if the person has or is suspected of having an apraxia or a neuromuscular disorder. A person's motor status is one of the primary determiners of the communication systems he can use (Silverman, 1980).

Even though this need was expressed by several authors, none of them provided a clear and organized method of examining the gross and fine motor limitations of a child with cerebral palsy as a consideration in the selection of an appropriate augmentative communication device. For example, Silverman (1980) included a list of twenty-seven gestures that "should be evaluated for accuracy, speed, force, presence of abnormal reflexes, presence of involuntary movements, and fatigue level for right and left extremities." His description of how to test for the gestures is complicated and no pictures clarify the instructions. Although he recognized the need to evaluate the presence of abnormal reflexes and involuntary movements, he did not describe methods to accomplish the task.

Judy Montgomery (1980) indicated the importance of examining motor areas. She included specific abilities that should be assessed such as range of motion, strength, endurance, etc., and briefly discussed the importance of positioning in intervention with a cerebral palsied child. She did not supply a detailed account of how to assess motor abilities, including normal and abnormal reflex patterns, neither did she relate the interaction between motor and communication development.

The successful use of an augmentative communication system with a cerebral palsied child depends on the extent to which it is designed to work effectively within the motor limitations of a child. The method chosen for a child to signal his thoughts and needs should be planned in consideration of speed and ease of communication as well as facilitation of normal gross and fine motor patterns. An example is a child

who demonstrates an ability to consistently hit a switch with his chin. Under the considerations of many evaluations forms, this movement might be used as his indication mode; however, this movement occasionally triggers an extensor thrust pattern. If this method of indication is chosen, it reinforces an abnormal pattern (extensor thrust) which the occupational or physical therapists may be working to reduce in therapy sessions.

Another example is a child who uses a head pointer to indicate pictured choices on a board mounted in front of him on his wheelchair. As the child turns his head from side to side to point, an asymmetrical tonic neck reflex causes unwanted involuntary arm movements. Even though the child is able to communicate by this method, detrimental side effects of the head pointing response make it a poor choice as an indication mode. These examples demonstrate the importance of considering an indication mode that will minimize the occurrence of abnormal motor patterns in the rest of the body.

Another concern of current evaluation techniques recommended in the literature is the trail and error approach often advocated by individuals as a method of selecting an augmentative communication system for a particular child. This methodology is stated in Harris and Vanderheiden:[15] "Selection of a technique is a process in which different systems are presented, tried, observed, modified, and changed, and observed again before another technique is considered."

This approach presents several problems. Three areas of

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[15] *Ibid.*

difficulty are summarized by Coleman, et al. (1980).

> Because of their quantity and cost, acquiring an adequate sample of communication devices, or fully testing all possible combinations of their components, is difficult. Second, the choice of device is limited to what is available and cannot keep pace with developments in technology. Third, this strategy focuses on the hardware rather than on the nonoral person.

It is hoped that the evaluation form included herein will provide an organized format from which a motor and language profile can be devised for each child. From this profile, many alternatives of augmentative communication systems can be eliminated and effective systems can be devised. Granted, trial treatments with various systems may have to be implemented and analyzed for effectiveness, but much of the guessing game approach will be avoided. This organized procedure is important in sparing the child confusion resulting from attempts to use a number of different communication systems as well as eliminating the loss of valuable time.

In summary, a review of the literature highlighted the importance of a total approach in the evaluation of a motorically handicapped child in the process of selecting augmentative communication systems. An organized guide to evaluation has not, however, been provided. It is hoped that the author's evaluation form has met this need.

Chapter 4

DEVELOPMENT OF THE EVALUATION FORM

The final decision about the content of the communication portion of the evaluation tool was reached following practical administration and revision. It was important to create an efficient form that provided ample information to facilitate the selection of an augmentative communication system. The goal was to keep the form simple yet maintain its effectiveness as an evaluation tool. This prompted six questions and discussion of the ultimate importance of obtaining the information to preseribe an augmentative communication system.

1. How does the child communicate?

The rationale for answering this question is obvious. It was hoped that a checklist format would help the clinician specify response to this immensely broad question. A sequence of normal communication development (reflexive vocalization, differentiated sound making, etc.) was abstracted from the literature (Creaghead, et al., 1980; McLean and Snyder-McLean, 1978) and included under the prespeech and speech sections of the assessment. A list of definitions and descriptions of each item precedes the evaluation form.

The items listed under the nonverbal section resulted from observations of the communication methods used by children with cerebral palsy. The importance of examining nonverbal language is summarized

by Schiefelbusch (1980): "Despite the importance of spoken language, however, Birdwhistle (1970) points out that spoken language accounts for only 35% of human social interaction while 65% of language is nonverbal." It is apparent that children with cerebral palsy demonstrate remarkable skill in learning how to express their thoughts and needs via a variety of effective augmentative techniques. An attempt was made to provide a checklist of the most frequently demonstrated techniques. Space was allowed for an *other* category for notations of additional idiosyncratic communication methods employed by various children.

2. What are the communicative intents expressed by the child?

This question provides a profile of the communicative functions demonstrated by the child. This information is important in the selection of the communicative intents to be included on the child's augmentative system. It seems logically important to build on the functions already demonstrated in the evaluation as important to the child. For example, if the child consistently whines to indicate pain or discomfort, providing body parts on his augmentative communication system allows him to be more specific and reduces the guessing game strategy that parents and teachers often have to employ. This may seem obvious to the reader, but it is surprising how often the priorities of adults take precedence over the communication needs demonstrated by the child. For example, parents expressed concern when their child returned from a week at camp showing signs of discomfort and irritability. That night, when they undressed the child for bed, they discovered a large sore on his foot. This type of situation is frustrating for the parents and the child.

The child's communication board includes many preacademic items, such as colors and numbers, that are most likely important to his teacher and/or parent(s). This clinician suggested that pictures of body parts be added to the communication board to enable the child to express areas of specific discomfort and reduce the occurrence of the same frustrating situation in the future. An examination of the communicative intents expressed by the child is valuable information in the decision making process regarding the content of an augmentative communication system.

3. When does the child initiate communication?

The rationale behind this question is a single word: *motivation.* The child uses his augmentative communication system if it provides a means of expressing something important. For example, parents often report that their child attempts to initiate communication during mealtime. One reason why is that the child wants to control something in his environment such as which foods are served. Again, the content of an augmentative communication system should be tailored to the specific needs of the child. This concept is especially important when an augmentative communication system is initially implemented because its success depends on the child's motivation to use it.

4. When does the child's ability to communicate alter? When excited, anxious, tired, angry, etc.?

It is important to evaluate the effect of emotional stimulation on the child with cerebral palsy. An explanation for this type of evaluation is provided by Crickmay (1966).

> It is important to take emotional stimulation into account in

> making an assessment, for a child may be able to make a movement in one situation and yet not be able to make it in another, depending entirely on the degree of emotional stimulation he is receiving.

In general, the cerebral palsied child's ability to perform a specific volitional movement (hitting a switch on a communication board) decreases as the amount of emotional stimulation increases. This factor has important implications for the design of the augmentative communication system as well as considerations for the control of outside stimulation in the environment.

5. Are specific communication methods preferred by the family or child?

An important reminder was provided by Cooper (cited by Crickmay, 1966): "We often forget that we are dealing with people and not merely an aggregate of disabilities and deformities." Each person is a composite of likes and dislikes, opinions, varying emotions, and individual motivation. The importance of including the child and his family in the decision making process cannot be undermined. This factor can make a large difference in the success of the augmentative communication technique selected.

6. What are the results of formal and informal language evaluation?

This part of the form provides a section to note the results of formal/informal language testing. The type of testing is totally dependent on the child's age and his abilities on the fine and gross motor sections of the assessment. The majority of children seen during the trial applications of this evaluation form were not able to demonstrate consistent responses required by many standardized test forms, thus informal measures were taken to determine the child's language abilities.

Chapter 5

ALTERATION OF STANDARDIZED TESTS AND EVALUATION CONSIDERATIONS

During the evaluations, items were often extracted from standardized tests and adapted to the special needs of the child. The tests used were the Sequenced Inventory of Communication Development (Hedrick, et al., 1975), Peabody Picture Vocabulary Test (Dunn and Dunn, 1981), Test for Auditory Comprehension of Language (Carow, 1973), and Assessment of Children's Language Comprehension (Foster, et al., 1972).

Sequenced Inventory of Communication Development

Alternation of the response mode is often required in the presentation of items from this test. For example, in order to determine understanding of prepositions, three blocks are placed in, on, and under three boxes and the child is told to "Look at the block in the box, etc." instead of requiring him to manipulate the blocks to stated positions. Care must be taken to present test items in a manner that ensures accurate interpretation of the child's method of response (i.e., if the respone mode is an eye gaze, test items should be spaced to avoid confusion as to where a child is looking).

In determining knowledge of body parts, a large doll can be used with the command, "Show me the baby's hair," etc. Again, an eye gaze response could be implemented. Alteration of the presentation in

this manner eliminates the finer motor movements required in pointing to one's own body parts. In response to commands involving two objects, the child can be asked to "Look at the cup and spoon" when five objects are placed in front of him instead of saying, "Give me the cup and spoon."

Completed portions of the evaluation form (fine and gross motor and language observations) will provide information to help determine adaptations necessary in the testing of a particular child. Testing experience with a variety of cerebral palsied children will foster new ideas for the adaptation of testing formats.

Peabody Picture Vocabulary Test, Test for Auditory Comprehension of Language, Assessment of Children's Language Comprehension

These standardized tests require the child to point to a picture following a verbal command such as "Show me clock," etc. As before, an eye gaze can be used instead of a pointing response. Another alternative response mode is described by Vicker (1974):

> If the child can produce reliable "yes" and "no" responses that can be clearly differentiated on the basis of vowel approximations, then the clinician can give the stimulus item and point to various test foils in a systematic pattern until the child gives an affirmative response.

She included that any means of indicating a yes/no response could be used as head shakes, eye blink signals, hand raise, etc.

Some cerebral palsied youngsters are unable to handle test items that contain three to six choices; covering up test foils may be necessary. For example, on the Assessment of Children's Language Comprehension test, five choices are given on each test item. Covering

alternate foils limits choices. It also provides space between the pictures which will facilitate accurate interpretation of the child's response.

IT MUST BE NOTED THAT, WHEN ALTERATIONS OF FORMALIZED TEST ITEMS ARE DONE, A STANDARDIZED TEST INTERPRETATION CANNOT BE USED.

General Considerations of Evaluation

The physical level at which the test items are presented to the child can affect the accuracy of response. For example, some children demonstrate improved head/neck control when the stimulus is presented in front of them, in midline, and at eye level. Visual deficits, attention, and motivation factors also need to be considered. Many children can attend for short periods, therefore the evaluation should be conducted in small blocks of time.

As is true with all children, the language evaluation need not be confined to periods of test administration. Valuable information can be obtained by observing the child during his daily routine. If the child becomes more active when asked, "Do you want to eat?" one might conclude that he understands the question. If behavior does not change when the question is asked but is altered when additional clues are provided (the refrigerator door is opened), one gains insight into the child's receptive language abilities.

Interpretation of responses of children with cerebral palsy are more difficult than with other children. As experience is gained in this area, competence is acquired in noticing the subtle means of communication these children often employ.

Chapter 6

COMMUNICATION EVALUATION

Terms used on the communication section of the evaluation form are outlined below.

I. Vocal/Verbal

A. Prespeech

1. Reflexive vocalizations

Sound making is generally manifexted in crying and fussing during the first weeks of life. The sounds produced are reflexive in nature; they have not yet been attached to meaning.

2. Differentiated sound making

Meaning is interpreted from the infant's cries, smiles, etc. For example, a mother reports that she can tell a hungry cry from a tired cry.

3. Cooing

This stage is marked by the vocalization of vowel sounds ("oo," "ah") with varying intonation changes.

4. Babbling

The child begins consonant production and combines them with vowels to produce repetitive sequences such as "mamama," "bababa."

5. Imitates sounds

   Child is heard to imitate many of his own sounds as well as the sounds made to him by others.

6. Jargon/meaningful inflection changes

   The infant seems to be playing with sounds. His vocalizations are characterized by different consonant-vowel combinations in one string with varying intonational patterns. The child sounds like he is talking his own language. Meaningful inflection changes are part of the jargon pattern. The child copies the inflection and intonation of an adult model.

B. Speech

1. Words

   A consistent referent is used for a particular object or action. The child's production may or may not sound like words of an adult. For example, "ba" used consistently to refer to a child's bottle would be considered a word.

2. Phrases

   The child puts two or more words together, but the utterances are not syntactically complete sentences.

3. Sentences

   a. The child produces functional, meaningful sentences. There may be structural and syntactical errors (verb tense, pronouns, plurals, etc.).

   b. The child produces syntactically complete sentences which include the small words (articles, prepositions, etc.).

II. Nonverbal

A. Gestures

1. Points

This category includes whole hand pointing as well as single finger pointing.

2. Headshakes

Horizontal and vertical head movements are included in this category. A gesture is usually a means to indicate a yes or no response.

B. Facial expression

1. Smile

A smile generally indicates pleasure. This type of pleasurable smile needs to be separated from a spastic or athetoid grimace that causes the mouth to turn up or the jaw to extend resulting from problems with muscle tone and coordination.

2. Frown

A frown generally indicates pain or displeasure.

3. Grimace

A grimace may be a signal of pain or discomfort or secondary to producing speech causing nares to flare, the forehead to wrinkle, etc.

C. Eye signals

1. Eye contact

The child is able to maintain focus on another person or an object. This is important to note because eye gaze can

often be used as an indication mode for an augmentative communication system.

2. Vertical and lateral eye movement

   The child is able to volitionally move his eyes from side to side or up and down. Eye movements of this type can be used to indicate a yes or no response (vertical eye movement means yes, lateral eye movement means no).

3. Blink

   The child is able to voluntarily open and close his eyes. Again, a signal system can be devised which will utilize an eye blink.

D. Body language

1. Turns head/body away

   The child moves himself away from another person or object. This motion usually indicates displeasure or a need to withdraw from a situation.

2. Moves self closer

   The child is able to move himself closer to a situation. This can often be interpreted as the expression of a desire to interact.

E. Written

1. Pictures

   The child demonstrates an ability to express himself through drawing pictures.

2. Words

   The child is able to legibly write to communicate.

F. Sign language

1. Words

A manual gestural system is used to communicate single words.

2. Phrases

Two or more words are signed by the child in one sequence.

3. Sentences

The proficient use of a manual sign system is observed.

III. Communicative Intents

The list includes examples of various functions that communication provides for a given child. For further information regarding pragmatics in communication, refer to Mclean and Snyder-McLean (1978). This may frequently be the most highly developed means of communication of the severely involved cerebral palsied child.

Test Instructions (Meek, forthcoming)

A separate room is the optimal setting [in which] to conduct the evaluation. If this is not available, select an area within the classroom where there is little distractibility.

Check the appropriate box (present, absent, not applicable) using the following criteria:

Present = The item is observed.

Absent = The item is not observed.

Not Applicable = The item is not appropriate for the child being evaluated.

Test Form

A copy of the test form appears on pages 27-34 .

Name:

Age:

	PRESENT	ABSENT	NOT APPLICABLE
GROSS MOTOR:			
Hypertonicity			
Hypotonicity			
Fluctuating tone			
Asymmetry (more involved: left, right)			
Contractures (hip, knee, elbow, shoulder girdle)			
Asymmetrical tonic neck reflex			
Tonic labyrinthine reflex			
Symmetrical tonic neck reflex			
Extensor thrust pattern			
Startles easily			
Sits with external support			
Maintains head control when sitting with support			
Sits independently			
Maintains head control when sitting independently			
Foot action to touch or push object			
FINE MOTOR:			
Grasp reflex			
Babkin's reflex			

(continued next page)

Name: Age:	PRESENT	ABSENT	NOT APPLICABLE
Palmo-mental reflex			
Brings hands to midline			
Weight bears on forearm			
Reaches with arm (left, right)			
Grasps voluntarily (radial, ulnar)			
Releases grasp voluntarily			
Wrist action (flexion, extension)			
Forearm (pronation, supination)			
Holds pencil or dowel in hands for pointing			
Uses isolated finger pointing			
VISUAL MOTOR:			
Focuses visually when head is held in midline			
Focuses visually when head is free to move			
ORAL MOTOR:			
Rooting reflex			
Sucking reflex			
Bite reflex			
Gag (hyperactive, hypoactive)			
Coordination of suck, swallow, breathe			

(continued next page)

Name:

Age:

	PRESENT	ABSENT	NOT APPLICABLE
Normal bite			
Munching			
Rotary chewing			
Lip closure during swallow			
Jaw grading			
Abnormal bite			
Jaw thrust			
Tongue thrust			
Overflow in oral area with fine motor activity			
Oral-facial hypersensitivity			
Drooling			
Facial expression			
Additional comments			

(continued next page)

Name:

Age:

	PRESENT	ABSENT	NOT APPLICABLE
HOW DOES THE CHILD COMMUNICATE?			
VERBAL/VOCAL			
PRESPEECH			
Reflexive vocalization/cries			
Differentiated sound making (cries, laughs)			
Coos			
Babbles			
Imitates sounds			
Jargon/meaningful inflection changes			
SPEECH			
Words			
Phrases			
Sentences			
NONVERBAL			
GESTURES			
Points			
Headshakes			

(continued next page)

Name:

Age:

	PRESENT	ABSENT	NOT APPLICABLE
FACIAL EXPRESSION			
Smile			
Frown			
Grimace			
EYE SIGNALS			
Eye contact			
Lateral eye movement			
Vertical eye movement			
Blink			
BODY LANGUAGE			
Turns head/body away			
Moves self closer			
WRITTEN			
Pictures			
Words			
SIGN LANGUAGE			
Words			
Phrases			

(continued next page)

Name: Age:	PRESENT	ABSENT	NOT APPLICABLE
Sentences			
OTHER			
WHAT ARE THE COMMUNICATIVE INTENTS EXPRESSED BY THE CHILD?			
Express recognition or greeting			
Show fear or discomfort			
Obtain a desired object or action			
Gain attention from another person			
Share an object or event			
Indicate pleasure			
Indicate displeasure			
Indicate a yes/no response			
WHEN DOES THE CHILD INITIATE COMMUNICATION?			
Mealtime			
Bedtime			
Dressing			
Watching television			
Group or sharing time in school			

(continued next page)

Name:

Age:

	PRESENT	ABSENT	NOT APPLICABLE
Playtime			
Other			
WHEN DOES THE CHILD'S ABILITY TO COMMUNICATE ALTER?			
When excited			
When anxious			
When tired			
When angry			
Describe			
ARE SPECIFIC COMMUNICATION METHODS PREFERRED BY THE FAMILY OR CHILD?			
Yes			
No			
Describe			

(continued next page)

RESULTS OF FORMAL AND INFORMAL LANGUAGE EVALUATION

Receptive Language

Formal test_____ Results_____

_____ _____

_____ _____

Formal test_____ Results_____

_____ _____

_____ _____

Informal testing_____

_____

_____

_____

Expressive Language

Formal test_____ Results_____

_____ _____

_____ _____

Formal test_____ _____

_____ _____

_____ _____

Informal testing_____

_____

_____

_____

Describe adaptations or alterations in standard testing procedures:

_____

_____

_____

_____

_____

_____

Chapter 7

APPLICATION OF EVALUATION RESULTS

A complete description of the effective use of evaluation form results in designing an augmentative communication system is provided in the manual to be published in September 1981 (Meek, forthcoming). As one reviews the evaluation form, the child's strengths and weaknesses should be highlighted. For example, if the child demonstrates an asymmetrical tonic neck reflex, an augmentative communication system should be designed to keep all activities in midline. If the child has an extensor thrust, neck flexion will help to reduce the occurrence of this abnormal pattern. Activities should be presented in such a way that neck flexion is part of the indication mode of the augmentative communication system.

Since many switches can be activated by hand or finger movements, the portion of the form that examines these is often important to the selection of an indication mode. It is important to note both movements the child is able to accomplish, as well as the effect of the movement on other parts of the body. For example, if purposeful reaching with a hand in an athetoid child causes extensive overflow of movement in other parts of the body (face, legs, etc.), an alternate indication mode that requires less volitional movement (eye gaze) may be used more effectively.

The communication section provides information about how the

child currently indicates his wants and needs. It also provides valuable information on what is important to him. As stated before, a child's motivation to use an augmentative communication system will often determine its success. It is imperative to design language intervention strategies which utilize communication abilities already demonstrated and take into consideration the desired intents expressed by the child.

With continued use of the form, the salient aspects become apparent more quickly. Speaking as a clinician who was inexperienced with the nonspeaking motorically impaired child six months ago, guidance in extensive practical application of this evaluation form was the best teacher.

Chapter 8

CASE STUDIES

Nine case studies of children with a range of language and motor abilities are presented. Specific problems that surfaced as a result of the evaluation on each child are included. It is hoped that the ideas rendered will facilitate the planning of augmentative communication systems for other children with similar problems.

The evaluation results are a guideline for initiating intervention with a child. Careful observation and re-evaluation, as well as common sense, provide a basis upon which to critique the effectiveness of an augmentative communication system over time.

Name: R. S.

Age: 6 years

R. S. is a severely involved child with hypotonia and contractures. His wheelchair provides extensive support for his entire body. The first major step to assist communication was to help R. S. realize that he could affect a change in his environment. Because of near total lack of volitional motoric control, a Zygo leaf switch (see Appendix B) was chosen. It was activated by a slight lateral movement of R. S.'s head. When the switch was activated, a colorful light apparatus began to turn which was reinforcing for R. S. Over a four week period, R. S. seemed to realize that a slight movement of his head could start and start the light apparatus.

This type of device could be used to switch on items that would be entertaining for R. S., such as a television set, a tape recorder, a toy train, or a robot. As indicated by the evaluation, R. S. often initiated communication to express distress or pain. The leaf switch could be used to activate a buzzer that would serve as a distress signal to someone in another room or out of immediate visual and auditory range.

R. S. has increased his motivation to communicate since application of these treatments was initiated.

Name: H. I.

Age: 4 years

H. I. is a four-year-old girl. She is diagnosed as a spastic quadriplegic with a strong asymmetrical tonic neck reflex (ATNR) and extensor thrust pattern. Good positioning must precede all other intervention. H. I. requires extensive support when sitting. This helps to improve her overall stability. An orthokinetic chair with side head and trunk support pads and abductor wedge is used. Presentation of items slightly below her eye level help to increase the head/neck flexion and reduce the extensor thrust pattern. Materials held in midline inhibit her strong ATNR.

H. I. was given a Zygo Model 16 Board (see Appendix C) which was activated by a hand hit switch mechanism. The teacher and speech-language pathologist reported difficulty in training H. I. to use the device. The problem centered around the complexity of the augmentative communication device, as well as motivational factors. The concept of hitting a switch to move a light in the selection of one square in a panel of four alternatives seemed too difficult for H. I. Too, she did not demonstrate interest in using the devise. It was felt that training to a less complex system such as an E-tran (see Appendix D) should be pursued. With the external support to keep her head in midline, H. I. can localize to pictures with her eyes.

Due to an apparent lack of motivation, selection of activities which would be exciting for H. I. was the next consideration. Her mother remarked that H. I. enjoyed being read to by an older sister,

therefor the E-tran board was initially used to display two (and eventually three and four) pictures of story choices to be read each afternoon when the sister arrived home from school. Once H. I. seemed to understand her ability to make choices, new items were presented on her E-tran board (food, toys, etc.) which served to broaden the scope of communication.

A child such as H. I. points out the importance of continuing assessment in the monitoring of an augmentative communication system. The original device selected may not demonstrate initial success; modifications or complete changes may be necessary.

Name: A. B.

Age: 2.6 years

A. B. has cerebral palsy with an athetoid component. Following administration of the evaluation form, it was determined that A. B.'s most reliable response was an eye gaze; however, A. B. had individual characteristics that needed to be considered before an augmentative communication system could be selected.

First, A. B. was easily distracted by any outside stimulation. Choosing a corner of the room and facing him away from windows or doors improved his responses during the evaluation. Second, placing objects/pictures approximately ten inches apart and at A. B.'s eye level resulted in increased consistency of response. Third, it became apparent that, when A. B. was allowed to touch test items after giving a correct eye gaze response, his willingness to comply increased with the demands of the evaluation.

Language therapy initially focused on the identification of three pictures on a board via an eye gaze. A correct response was rewarded by allowing A. B. to manipulate the pictured object. It is hoped that this practice will facilitate the use of an E-tran communication system which has been ordered for A. B.

Name: E. F.

Age: 4 years, 11 months

E. F. has spastic quadriplegia. He is hypertonic and, even with facilitation, muscle tone does not reduce to within normal limits. He has a strong symmetrical tonic neck reflex and extensor thrust pattern. He is able to maintain head control when sitting with external support. He has a corner chair for mealtimes and other activities and a scooter-board for mobility in class. E. F. also has a travel wheelchair with side supports and an abduction wedge. He is learning to push his wheelchair by turning the wheel. He is also learning to hold a spoon at mealtime. E. F. currently communicates by signs, gestures, a few words, and body language. He is a good candidate for a consistent augmentative communication system to improve and clarify all the communication he has developed on his own.

In E. F.'s classroom setting, he is offered three pictures from which to make various choices during the daily routine. For example, three pictures of food items are presented at lunch; E. F. indicates his favorite by putting his hand on one.

E. F. seems ready to use a more complete system of communication. A Zygo board with a standard hand hit switch could be introduced. He has demonstrated ability to make a selection from four alternatives, thus an attempt to increase the number of choices should be made. Items should include pictures of family members, favorite toys and foods, and daily needs (toilet). The expansion of items will depend on E. F.'s ability to adapt to the increased number of choices.

An alternative to the Zygo system would be a plexiglass covered

board displaying the pictures previously mentioned, mounted directly on his wheelchair. E. F. demonstrates fairly controlled hand movement but not isolated finger motion. Pictures would need to be adequately spaced in order to avoid confusion.

Name: C. D.

Age: 5 years

C. D. is a spastic quadriplegic who demonstrates increased motoric involvement in his upper extremities in comparison to his lower extremities. He has severe dysarthria and a drooling problem which requires three or four bib changes per day. He tries to communicate orally but is highly unintelligible.

A communication booklet has been devised for C. D. Communication is achieved by pointing to pictures. As noted in the evaluation, C. D. demonstrates controlled isolated finger movement so the chosen mode of response is appropriate for him. C. D.'s booklet includes three pages of pictures that help him to communicate many of his thoughts and needs. The first page provides a written explanation of C. D. (name, address, etc.) and introduces the booklet as his means of communication with others. The following pages include pictures of C. D., his family, various animals, objects (from toys to wheelchairs), colors, numbers, and body parts. Representations are made of weather (rain, snow, etc.), emotions (happy, sad, angry, etc.), prepositions (in, on, under) and actions (eating, sleeping, etc.). C. D.'s booklet is a tailored device; it represents a great deal of insight from those who surround him.

As C. D.'s language becomes more complex, alternate means of communication will need to be considered. A Handivoice could eventually be introduced due to C. D.'s current success in indicating with accurate isolated finger movement. A Handivoice would provide a good back-up

system when communication fails due to a lack of speech intelligibility. Providing a back-up system is summarized by Harris and Vanderheiden[16] as contributing to reducing tension or pressures related to oral expression by providing a nonvocal communication mode to fall back on should the spoken message be unintelligible."

---

[16] *Ibid.*

Names: S. C. and R. C. (twins)

Age: 2 years, 6 months

S. C. and R. C. have spastic quadriplegia. From their mother's report, the boys demonstrate a great deal of motivation to communicate during their daily routines. To ensure consistency of response, one might start with utilizing an eye gaze in the selection of objects centered around a favorite activity. For example, due to an increased tendency to initiate communication around mealtime, two or three choices could be offered on a tray and the question asked, "Which one do you want?" It is important to adequately space the items so as to facilitate accuracy of response. The number of choices given will depend on observations of the boys's ability to respond.

This same type of activity could be performed by putting objects on an E-tran board. At this age, objects generally provide a more attractive stimulus than pictures; but, as the children get older, a change in stimulus type should be considered. Objects on the E-tran could include favorite toys (cars, small musical toys, etc.); S. C. or R. C. would be asked to choose a desired toy. When an eye gaze signal is given, the toy is taken off the board and given to the child.

When reviewing evaluation results, it is apparent that R. C. and S. C. demonstrate less motoric involvement on their right sides. An attempt to utilize the children's ability to reach with their right arms and hands could be implemented as a mode of response. One would first have to position the child to give him the necessary support to

facilitate accurate arm movements. For example, due to poorer head control, S. C. would have to be supported more thoroughly than R. C. When in a stable position, which inhibits abnormal patterns, two or three objects are offered slightly to the right of midline and at a distance that requires full extension of the right arm (to reduce the likelihood of the child pulling his arm into full flexion when an object is grasped). The child would then reach out with full right arm extension to indicate a desired toy.

As noted in the evaluation, R. C. is beginning to use speech to communicate. Providing language stimulation via an augmentative channel will also facilitate the vocal mode as the child's communication abilities develop. This concept is summarized by Chapman and Miller:[17] "Nonvocal systems can augment vocal production, whether as an initial strategy for teaching language or as a means of facilitating productive vocal communication." As in all language therapy, it is important to consistently provide a child with language models appropriate for his developmental level and to reinforce all attempts to communicate.

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[17]R. Chapman and J. Miller, "Cognitive and Language Prerequisites to the Introduction of a Non-vocal Communication System," *Nonspeech Language and Communication*, ed. R. L. Schiefelbusch (Baltimore, Maryland: University Park Press, 1980).

Name: L. L.

Age: 7 years

L. L.'s motor involvement is characterized by hypotonia and fluctuating tone. In general, he demonstrated minimal volitional movement during administration of the evaluation. It was reported by his classroom teacher that, when L. L. was highly motivated to obtain an object, he was able to reach out with his hand. This movement was facilitated by putting L. L. in certain positions (side lying). The importance of comparing the evaluation results against observations made by individuals who have consistent exposure to the child (parent, teacher, etc.) is evident. In light of the report given, it became imperative that motivational factors be discussed with those around L. L. in order to establish an effective reinforcement for the initial training in the use of a switch.

Because L. L. had demonstrated success when reaching with his arm and hand, a hand hit switch was selected. The first goal for L. L. was to help him understand that a specific movement (his hand hitting the switch) could effect a positive change in his environment (a toy dog begins to walk and make noise). Due to L. L.'s visual impairment, the reinforcements needed an auditory component. Another device that proved effective included pairing the switch with the activation of a tape recorder that played his favorite songs.

This type of program could be extended to pairing a bright light and auditory signal (a bell) to two different food choices or toys.

Name: B. F.

Age: 2 years

B. F. has mixed (spastic and athetoid) cerebral palsy. In the planning of an initial augmentative communication system, one needs to look at the entire picture presented as a result of the evaluation. It is apparent that B. F. is able to get what he wants by reaching with his hand, but he demonstrates a great deal of overflow in the purposeful movements. An ATNR is present. It therefore becomes important to keep all languaged based activities in midline. B. F. also demonstrates an extensor thrust. An attempt to keep flexion in the neck by presenting activities below his eye level will help to reduce tendencies for this abnormal pattern to occur. Initially, an eye gaze signal system might be utilized to establish consistency of response with little volitional movement required. It is important to plan an activity around something that is important to B. F. If B. F.'s mother reports that he initiates communication at mealtime, he could be offered two foods and asked, "Which one do you want?" When B. F. consistently responds to two choices, three and four choices can be offered. This same type of activity can be implemented around the choice of toys during playtime or any other situation during which B. F. attempts to initiate communication.

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Zygo Industries, Inc. Manufacturer of Augmentative Communication Systems, P.O. Box 1008, Portland, Oregon.

A P P E N D I X A

Table 1

Augmentative Communication System Schematic

Technique (means to transmit (idea)	Symbol Set/System (means to represent idea or concept)	Communication/interaction behavior (as necessary to have idea received and understood)
Unaided	Blissymbolics	
Aided	Rebus	
	Traditional and nonstandard orthography	
	Signs of American sign language	
	Signs of signed English	
	American Indian signs	
	Spoken words	

Source:

American Speech-Language-Hearing Association, "Non-speech Communication: A Position Paper." *American Speech-Language-Hearing Association,* 22 (1980), 267-272.

A P P E N D I X B

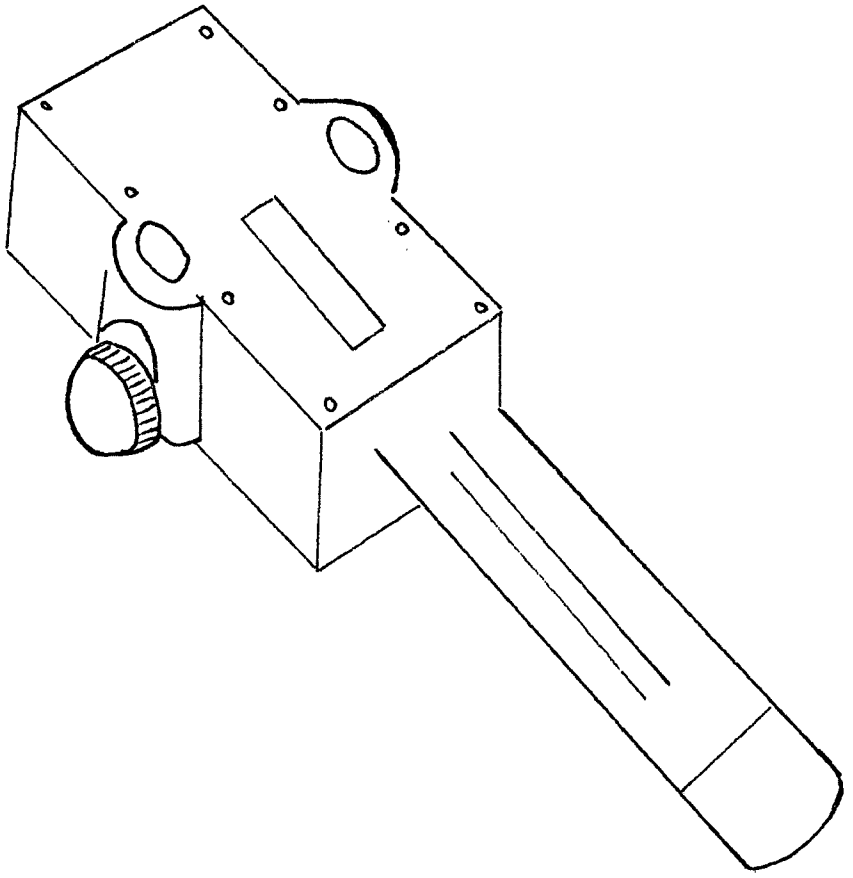
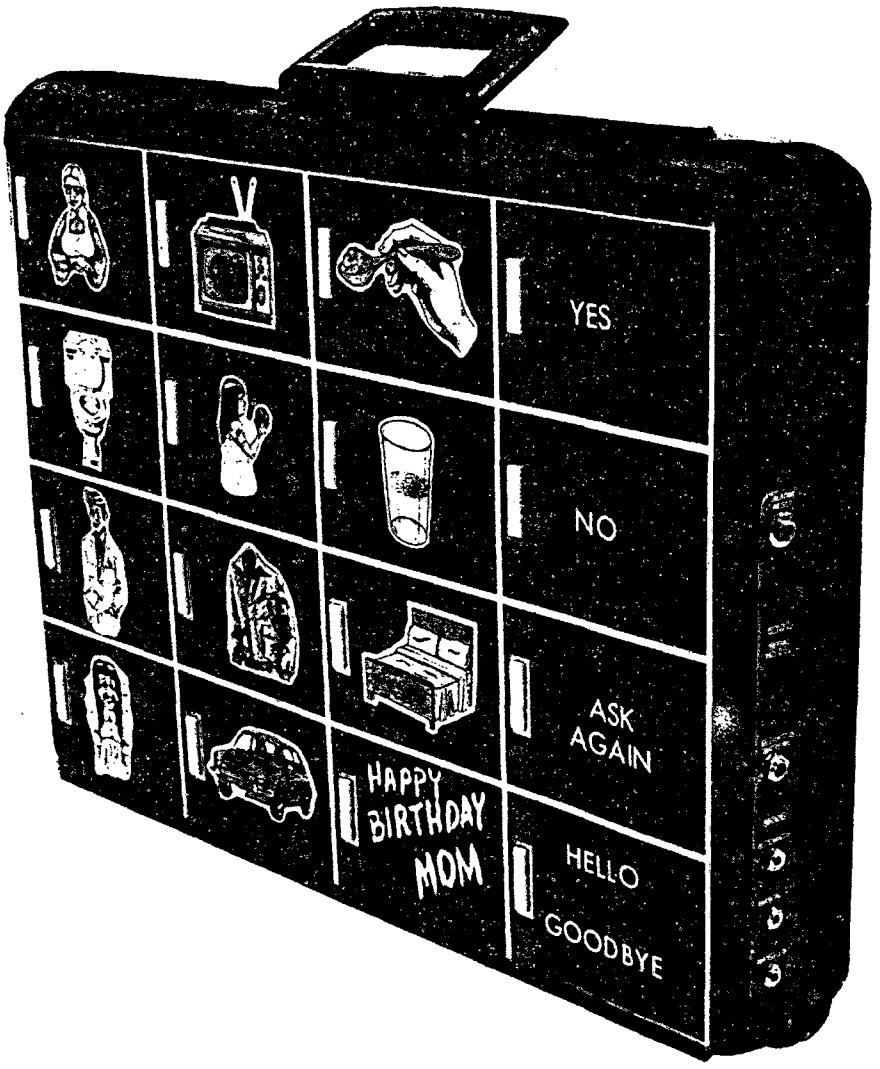


Figure 1. Leaf Switch. A silent, flexible switch activated by slight motoric movement. The switch is normally open; it is activated by deflecting the leaf.

Source:

Zygo Industries, Inc., Manufacturer of Augmentative Communication Systems, P.O. Box 1008, Portland, Oregon.

A P P E N D I X C



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A P P E N D I X D

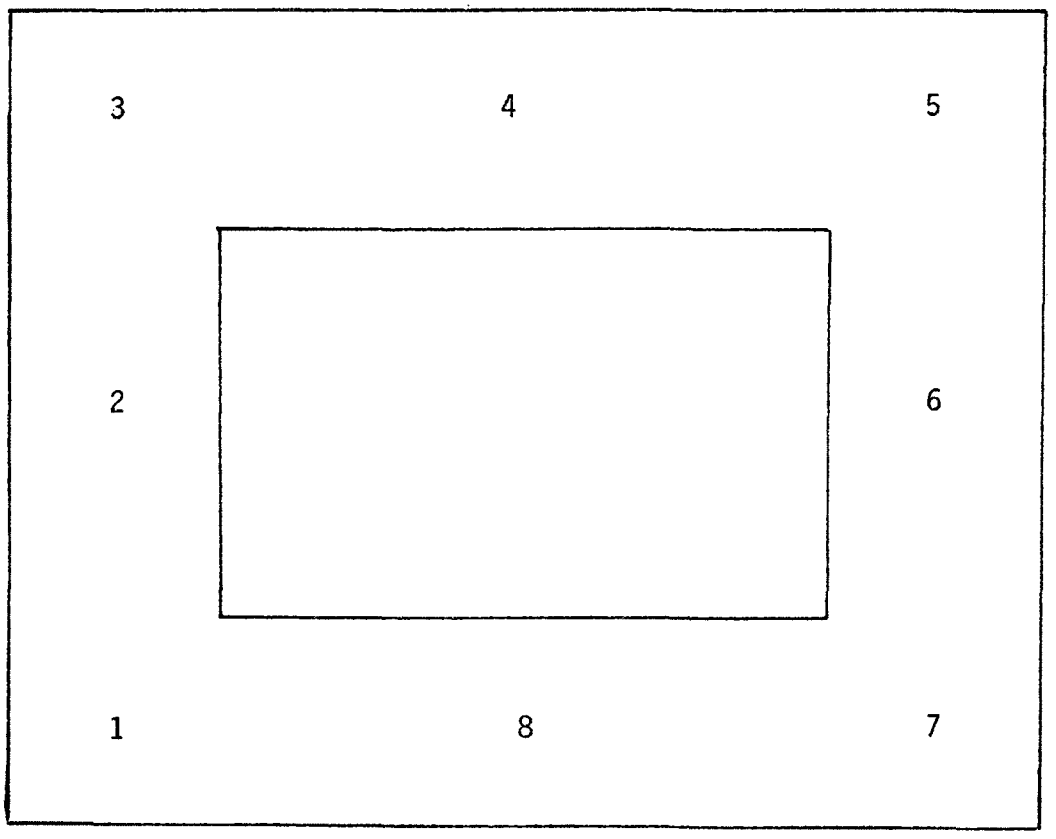

Figure 2. E-tran. An eye pointing chart generally made from plexiglass. Pictures or objects are displayed in the numbered spaces.

Source:

Franklin L. Silverman, *Communication for the Speechless* (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1980).